Generative AI Finance: Risks and Potential Solutions

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Abstract

Generative Artificial Intelligence (AI) captured the attention of academics, policymakers, the private sector and some regulators in 2022 after the launch of ChatGPT and its widespread adoption worldwide. Then, in 2023, Microsoft Chairman and Chief Executive Officer Satya Nadella said during the World Economic Forum session that the 'golden age' of AI is underway and generative AI plays a big role in it. Accordingly, OpenAI, the company behind the launch of ChatGPT, received multibillion dollar investments from Microsoft.[2] Additionally, Google and Meta created their generative AI models. Given the multiplicity of potential use cases of generative AI models, not only the tech industry is interested in this development. Many industries were caught in the hype of generative AI including the financial sector. Indeed, financial institutions worldwide are deploying generative AI and are starting with internal uses. However, along with that comes potential pitfalls and challenges. This paper argues that addressing the risks and challenges of generative AI requires a context and sector-specific debate. The challenges of using AI highly depend on the context where the models are implemented and used. Namely, generating content to provide financial advice has different implications for society than generating the image of a turtle. Hence, in the current debate about AI governance, and specifically in the generative AI space, it is important to analyse the risks of generative AI in finance. This paper is a first attempt to map the ethical and legal risks of generative AI in the financial sector given than previous scholarship and most policy discussions have focused on the risks of predictive AI in the financial sector. Based on this analysis and following a functional approach, the paper also proposes an avenue to deal with the risks created by generative AI in finance.

Keywords:
Generative AI, financial sector, AI governance, artificial intelligence, predictive AI, finance, AI regulation, financial regulation.

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[2] Microsoft Confirms Its $10 Billion Investment Into ChatGPT, Changing How Microsoft Competes With Google, Apple And Other Tech Giants, Forbes (27 January 2023) <https://www.forbes.com/sites/qai/2023/01/27/microsoft-confirms-its-10-billion-investment-into-chatgpt-changing-how-microsoft-competes-with-google-apple-and-other-tech-giants/?sh=a9a12fa36246> accessed 13 June 2023.

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1. Introduction

Generative Artificial Intelligence (AI) captured the attention of academics, policymakers, the private sector and some regulators in 2022 after the launch of ChatGPT[3] and its widespread adoption worldwide.[4] Then, in 2023, Microsoft Chairman and Chief Executive Officer Satya Nadella said during the World Economic Forum session that the 'golden age' of AI is underway and generative AI plays a big role in it.[5] Accordingly, OpenAI, the company behind the launch

[3] ChatGPT was launched on November 30, 2022. See OpenAI, *Introducing ChapGPT* (2022), https://openai.com/blog/chatgpt <accessed 12 June 2023>

[4] Within just two months of its launch, Chat GPT was estimated to have reached 100 million monthly active users and It is expected to grow at a compound annual growth rate (CAGR) of 22% from 2020 to 2025, reaching a market value of nearly US$14 billion by 2025. NapSaga, Chat GPT: Achieving 100 Million Users in Just 2 Month — A Deep Analysis, Artificial Intelligence in Plain English (1 May 2023) <https://ai.plainenglish.io/chat-gpt-achieving-100-million-users-in-just-2-month-a-deep-analysis-a453e6f85acf> accessed 13 June 2023.

[5] Emma Charlton, *3 trends will shape the future of work, according to Microsoft's CEO,* The World Economic Forum (10 February 2023) <https://www.weforum.org/agenda/2023/02/future-jobs-workplace-ai-microsoft/> accessed 13 June 2023.

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of ChatGPT, received multibillion dollar investments from Microsoft.[6] Additionally, Google[7] and Meta created their generative AI models.[8] Given the multiplicity of potential use cases of generative AI models, not only the tech industry is interested in this development. Many industries were caught in the hype of generative AI. Financial institutions are also deploying generative AI for use cases such as fraud detection, compliance, consumer-facing chatbots, and internal processes.[9]

However, until this day, most of the debates around AI Governance and AI regulation have been centred around predictive AI.[10] Additionally, are not often based on a proper discussion and analysis about the risks created by generative AI models and its use in specific sectors. Consequently, the absence of a thorough discussion an analysis of the risks of generative AI may derail the development of the technology while failing to tackle the most important challenges of these models.[11] This has been the case in the European Union where the proposed AI Act considers generative AI as a *foundation model*. Providers of foundation models would have to comply with additional obligations, like transparency obligations, requirements about registration, train, design, dataset standards, among others.[12] The scope of this approach results in extensive documentation obligations and audit requirements, but vague in terms of the meaning behind in terms of how such burden connect to the risks created by generative AI.

Similarly, without entering in the analysis of sector-specific risks of generative AI, the United States Senate scheduled a first hearing of a series to help legislators design regulations around the ethical, legal and national security concerns of AI. In this first hearing, held on 16 May 2023, Sam Altman, the chief executive of ChatGPT's OpenAI, testified that generative AI needs

[6] Microsoft Confirms Its $10 Billion Investment Into ChatGPT, Changing How Microsoft Competes With Google, Apple And Other Tech Giants, Forbes (27 January 2023) <https://www.forbes.com/sites/qai/2023/01/27/microsoft-confirms-its-10-billion-investment-into-chatgpt-changing-how-microsoft-competes-with-google-apple-and-other-tech-giants/?sh=a9a12fa36246> accessed 13 June 2023.

[7] Discover: Generative AI, Google < https://ai.google/discover/generativeai/> accessed 13 June 2023.

[8] Santosh Janardhan, Reimagining Our Infrastructure for the AI Age (18 May 2023) <https://about.fb.com/news/2023/05/metas-infrastructure-for-ai/> accessed 13 June 2023.

[9] Catherine Leffert, How can banks adopt generative AI < https://www.americanbanker.com/list/how-banks-can-adopt-generative-ai > (25 August 2023)

[10] Nydia Remolina, The Role of Financial Regulators in Algorithmic Credit Scoring.

[11] Philipp Hacker, *Generative AI at the Crossroads* (12 June 2023) <https://blogs.law.ox.ac.uk/oblb/blog-post/2023/06/generative-ai-crossroads> accessed 13 June 2023.

[12] See Committee on the Internal Market and Consumer Protection Committee on Civil Liberties, Justice and Home Affairs, DRAFT Compromise Amendments on the Draft Report - Proposal for a regulation of the European Parliament and of the Council on harmonised rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts (9 May 2023) <https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/CJ40/DV/2023/05-11/ConsolidatedCA_IMCOLIBE_AI_ACT_EN.pdf > accessed 13 June 2023.

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to be regulated.[13] He even proposed the formation of an agency that would license the most powerful AI systems and have the authority to take that license away and ensure compliance with safety standards.[14] However, the discussion was not context or sector-specific.

Regarding predictive AI in finance, regulators have adopted different approaches.[15] Some regulators have adopted a risk-based approach or a light touch approach to guide the industry depending on the materiality of certain use cases. For instance, credit scoring AI models are classified as high-risk models under the European Union AI Act.[16] Also, other regulators that have adopted a voluntary approach to AI governance have emphasised the importance of considering the materiality of the specific use cases in determined sector. I.e., the Monetary Authority of Singapore (MAS) launched the Veritas Initiative. Under this initiative, MAS suggested an assessment methodology to help financial institutions validate the fairness, Ethics, Accountability and Transparency, of specific AI use cases such as credit scoring, insurance predictive underwriting, customer marketing, and fraud detection.[17]

This paper argues that addressing the risks and challenges of generative AI requires a context and sector-specific debate. The challenges of using AI highly depend on the context where the models are implemented and used. Namely, generating content to provide financial advice has different implications for society than generating the image of a turtle. Hence, in the current debate about AI governance, and specifically in the generative AI space, it is important to analyse the risks of generative AI in finance. This paper is a first attempt to map the risks of generative AI in the financial sector given than previous scholarship and most policy discussions have focused on the risks of predictive AI in the financial sector. Based on this analysis and following a functional approach, the paper also proposes an avenue to deal with the risks created by generative AI in finance.

2. The differences between generative AI and predictive AI

The policy and regulatory approaches to AI do not often address the ethical, legal and governance of generative AI and predictive AI differently. Thus, not many discussions about

[13] United States Senate, Subcommittee on Privacy, Technology and the Law, Oversight of A.I.: Rules for Artificial Intelligence (16 May 2023) <https://www.judiciary.senate.gov/committee-activity/hearings/oversight-of-ai-rules-for-artificial-intelligence> accessed 13 June 2023.

[14] Ibid.

[15] Nydia Remolina, *The Role of Financial Regulators in the Governance of Algorithmic Credit Scoring*, SMU CENTRE FOR AI & DATA GOVERNANCE RESEARCH PAPER NO. 2/2022 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4057986>

[16] The European Commission, Regulatory framework proposal on artificial intelligence <https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai> accessed 13 June 2023.

[17] The Monetary Authority of Singapore, MAS-led Industry Consortium Publishes Assessment Methodologies for Responsible Use of AI by Financial Institutions (4 February 2022) <https://www.mas.gov.sg/news/media-releases/2022/mas-led-industry-consortium-publishes-assessment-methodologies-for-responsible-use-of-ai-by-financial-institutions> accessed 13 June 2023.

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the risks of generative AI and how different these models are from predictive AI - or other types of AI - have been guiding the regulatory design. Similarly, AI regulation applicable to financial services and products – even the light approaches such as guidelines about the ethical principles of artificial intelligence in the financial sector – do not make a distinction in any jurisdiction between generative AI and predictive AI.

Seemingly, the European Union has tried to be a first mover proposing a regulatory approach in the AI Act that tries to address generative AI models.[18] However, this approach falls short. Certainly, the AI Act follows a principles-based approach and a risk-based approach[19] which means that the riskier the model is, the requirements for companies developing AI models will be higher. After months of deliberations, last-minute adjustments were introduced pertaining to generative AI.[20] Under the AI Act, generative AI is considered a foundation model. Providers of foundation models would have to comply with additional requirements, like transparency obligations, requirements about registration, train, design, dataset standards, among others.[21] The scope of this approach results in extensive documentation obligations, but vague in terms of the meaning behind certain requirements and how those obligation connect to the risks created by generative AI. In practice, the latest proposal of the EU Act treats foundation models as high-risk applications resulting in additional and onerous requirements and obligations to mitigate risks that may never materialize.[22] Moreover, questions about enforceability and meaning of certain obligations are yet to be settled. These questions will be discussed in the trialogue between the Parliament, the European Commission and the Council.[23] Similarly, the General Data Protection Regulation (GDPR) underwent the same process. As a result of such trialogue, some safeguards applicable to

[18] The European Commission, executive branch of the European Union has been working on the AI Act since early 2020. In April 2021, the Commission proposed a set of draft regulations. On May 2023, the Internal Market Committee and the Civil Liberties Committee adopted a draft negotiating mandate on the first ever rules for Artificial Intelligence with 84 votes in favour, 7 against and 12 abstentions. Before negotiations with the Council on the final form of the law can begin, this draft negotiating mandate needs to be endorsed by the whole Parliament, with the vote expected during the 12-15 June session. See News European Parliament, AI Act: a step closer to the first rules on Artificial Intelligence (2023) <https://www.europarl.europa.eu/news/en/press-room/20230505IPR84904/ai-act-a-step-closer-to-the-first-rules-on-artificial-intelligence#:~:text=On%20Thursday%2C%20the%20Internal%20Market,7%20against%20and%2012%20abstentions.> accessed 13 June 2023.

[19] European Commission, European AI Alliance - The EU AI Act's Risk-Based Approach: High-Risk Systems and What They Mean for Users (16 January 2023) <https://futurium.ec.europa.eu/en/european-ai-alliance/document/eu-ai-acts-risk-based-approach-high-risk-systems-and-what-they-mean-users> accessed 13 June 2023.

[20] Ibid.

[21] See Committee on the Internal Market and Consumer Protection Committee on Civil Liberties, Justice and Home Affairs, DRAFT Compromise Amendments on the Draft Report - Proposal for a regulation of the European Parliament and of the Council on harmonised rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts (9 May 2023) <https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/CJ40/DV/2023/05-11/ConsolidatedCA_IMCOLIBE_AI_ACT_EN.pdf > accessed 13 June 2023.

[22] Philipp Hacker, Andreas Engel, Marco Mauer, *Regulating ChatGPT and other Large Generative AI Models*, Working Paper (2023) <https://arxiv.org/pdf/2302.02337.pdf> accessed 13 June 2023.

[23] Trialogue EU Ai act.

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automated decision-making, included in previous versions of the GDPR, were excluded.[24] Hence, the proposed approach by the European Union not only is limited since it only applies to providers regulated by the EU AI Act, but also, its obligations and requirements might not make it to the final version of the Act.

Hence, the current approaches in AI governance and regulation do not address how ethical, legal, and governance challenges should if address in predictive AI versus generative AI.[25] Predictive AI and generative AI are two distinct branches of artificial intelligence that have different purposes and functionalities. This is especially relevant in finance in the AI governance discussion, as this paper proceeds to explain.

On the one hand, generative AI refers to the use of AI to create new data, such as audio, images, texts, and more.[26] The AI models that are part of this subfield of AI find and learn patterns in the given data set to produce new data that is similar to the given data set.[27] The model is not designed with the specific purpose of following some instructions to make decisions if some conditions are met, or to predict an output based on a data set. Generative AI models require large training data sets to learn the patterns and generate the outcome. A trivial example of this, is a generative AI model that is trained on a given data set to create an image of a turtle. The given data set in this case would contain many images of turtles from which the model can learn the patterns of a turtle to generate images that would look like this animal. The turtles generated by the model are not contained in the given data set. These generated images are often referred to as synthetic data.[28]

The following graph explores 3 prominent methodologies for creating generative AI models:

[24] Sandra Wachter, Brent Mittelstadt, Luciano Floridi, *Why a Right to Explanation of Automated Decision-Making Does Not Exist in the General Data Protection Regulation* (2017) 7.2 INTERNATIONAL DATA PRIVACY LAW 76

[25] Bale, Ajay Sudhir, et al. "The Impact of Generative Content on Individuals Privacy and Ethical Concerns." International Journal of Intelligent Systems and Applications in Engineering 12.1s (2024): 697-703.

[26] David Foster, Generative Deep Learning. O'Reilly Media, Inc. (2022).

[27] Footnote 33

[28] Data produced artificially with the purpose of training AI models. Sergey I. Nikolenko, Synthetic data for deep learning. Vol. 174. Springer Nature, 2021.

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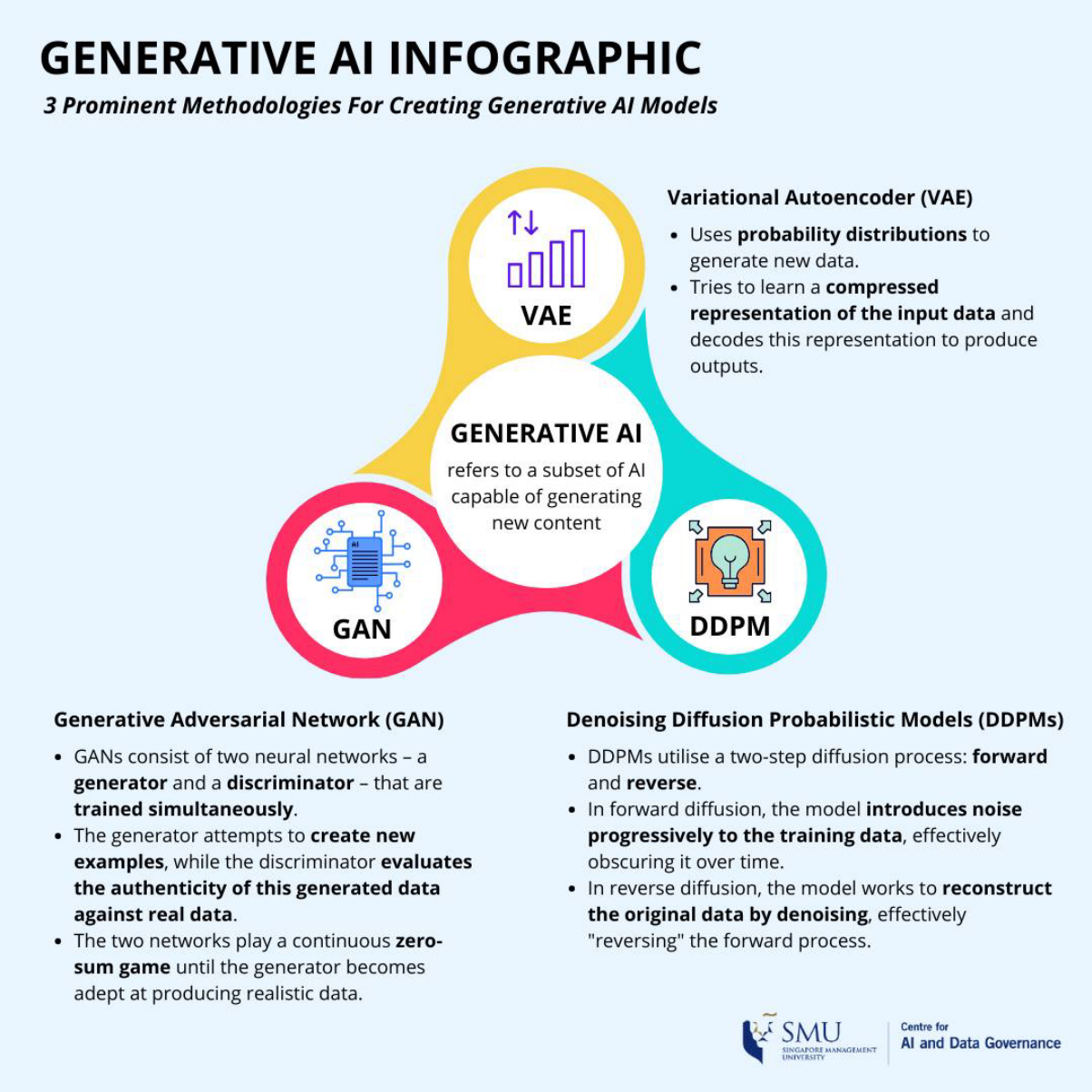

Source: SMU Centre for AI and Data Governance (2023)

Generative AI techniques can be applied to financial sector data to develop trading strategies and investment models. By generating synthetic market data and simulating trading scenarios, these models can assist in predicting market movements, identifying patterns, and generating insights that can be used for decision-making.[29]

On the other hand, predictive AI refers to systems designed to predict outcomes based on data. It uses statistical techniques to interpret past data and make predictions about future events. They analyse historical data to identify patterns or trends and make predictions about

[29] Coletta, Andrea, et al. "Towards realistic market simulations: a generative adversarial networks approach." Proceedings of the Second ACM International Conference on AI in Finance. 2021.

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future events.[30] Thus, predictive AI analyses existing data to make predictions, while generative AI generates new content based on learned patterns. Predictive AI in finance is often use in cases such as algorithmic credit scoring. In these use cases, a lender uses AI to predict a borrower's likelihood of repaying a loan.[31]

Due to the different capabilities and applications of these technologies, the nature of the ethical, legal and governance challenges can vary considerably. [32] For instance, predictive AI models such as algorithmic credit scoring have the potential to perpetuate biases and discrimination due to societal prejudices embedded in the data. If the data historically has excluded certain groups of individuals, the use of AI to predict the creditworthiness of such individuals has the potential to perpetuate biases and exacerbate the problem of financial exclusion.[33] The use of generative AI could intensify this potential effect because of the way in which data is created in this type of systems. The content that the model creates is increasingly difficult to distinguish from real data. If that content finds its way back into future models as training data, next generation AI models could become even more biased, creating a snowball effect of compounding bias with potentially wide implications for access to finance.[34]

3. Generative AI in Finance – still at an experimental stage

Generative AI could be used in various ways in the financial sector to enhance decision-making, automate processes, and improve customer experiences. Most financial institutions are currently exploring use cases and researching which models and practices would be benefit them the most. Banks like JPMorgan Chase, Wells Fargo, Goldman Sachs, DBS have been experimenting with AI for some time and now are ideating generative AI-powered systems.[35] One example of generative AI in finance is the use of Generative Adversarial Networks (GANs) for fraud detection. GANs can be trained to generate synthetic financial transaction data that mimics normal consumer behaviour. By doing so, financial institutions

[30] Ishan Kapoor, Predictive AI vs. Generative AI: Unveiling the Distinctions (27 May 2023) < https://www.linkedin.com/pulse/predictive-ai-vs-generative-unveiling-distinctions-ishan-kapoor/>

[31] Nydia Remolina, The Role of Financial Regulators in the Governance of Algorithmic Credit Scoring, SMU Centre for AI & Data Governance Research Paper 2 (2023); Perel, Maayan, and Ruth Plato-Shinar. "AI-based consumer credit underwriting." Artificial Intelligence in Finance. Edward Elgar Publishing, 2023. 151-176.

[32] Nicoletti, Leonardo, and Dina Bass. 2023. “Humans Are Biased: Generative AI Is Even Worse.” Bloomberg Technology + Equality. Accessed June 23, 2023. https://www.bloomberg.com/graphics/2023-generative-ai-bias/

[33] Nydia Remolina, The Role of Financial Regulators in the Governance of Algorithmic Credit Scoring, SMU Centre for AI & Data Governance Research Paper 2 (2023); Perel, Maayan, and Ruth Plato-Shinar. "AI-based consumer credit underwriting." Artificial Intelligence in Finance. Edward Elgar Publishing, 2023. 151-176.

[34] Leonardo Nicoletti and Dina Bass explain this problem in the context of generative AI creating images. See Nicoletti, Leonardo, and Dina Bass. 2023. “Humans Are Biased: Generative AI Is Even Worse.” Bloomberg Technology + Equality. Accessed June 23, 2023. https://www.bloomberg.com/graphics/2023-generative-ai-bias/

[35] Catherine Leffert, How can banks adopt generative AI < https://www.americanbanker.com/list/how-banks-can-adopt-generative-ai > (25 August 2023)

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can then train their fraud detection models to identify anomalies or patterns that deviate from these synthetic 'normal' transactions, which may indicate fraudulent activity. Namely, JP Morgan Chase is using large language models[36] to detect fraud by examining patterns in emails for signs of compromise.[37] Likewise, Goldman Sachs is using generative AI to assist software engineers in code development.[38] SouthState Bank, trained an enterprise-version of ChatGPT that allows employees to use it to query on bank policies, draft emails and summarize meetings.[39] In Singapore, DBS is leveraging AI to enhance its operation too. According to publicly available data, there are currently more than 300 AI use cases across the financial institution. This resulted in a revenue uplift of $150 million in 2022 - double that in 2021 -, and $30 million from cost avoidance due to enhanced credit monitoring, fraud prevention and productivity gains.[40] As most financial institutions leveraging AI, DBS is experimenting with generative AI and running small-scale pilots to see if it can help improve revenue and employee productivity as well as other internal use cases such as helping employees grow their careers.[41]

As generative AI's applications in the financial sector continue to evolve it is crucial to address the risks created when implementing generative AI systems in finance to ensure responsible and secure use. Those risks should be independently evaluated from those created by other artificial intelligence models currently used in finance.

4. The new and old risks of generative AI in finance

Generative AI brings renewed attention to many of the risks created by AI, such as the potential to perpetuate bias hidden in training data, while presenting new ones that require attention from policymakers.

4.1. Financial Hallucinations

The problem of "hallucination" in generative AI refers to instances where the AI model generates information that is not based in reality or is factually incorrect. This can happen

[36] A language model is a machine learning model that aims to predict and generate plausible language. A large language model has been trained on a vast corpus of text data and is a specific application of generative AI. Jakub M. Tomczak, Deep Generative Modeling, Springer (2022)

[37] Penny Crosman, JPMorgan Chase using advanced AI to detect fraud, American Banker (3 July 2023) <https://www.americanbanker.com/news/jpmorgan-chase-using-chatgpt-like-large-language-models-to-detect-fraud>

[38] Penny Corsman, AI will make workers 'superhuman': Goldman Sachs CIO Marco Argenti, American Banker, https://www.americanbanker.com/news/ai-will-make-workers-become-superhuman-goldman-sachs-cio-marco-argenti

[39] Penny Crosman, 'It's worth all the hype': SouthState Bank deploys enterprise ChatGPT, American Banker https://www.americanbanker.com/news/its-worth-all-the-hype-southstate-bank-deploys-chatgpt-like-tech

[40] Nurdianah Md Nur, DBS shares its secret to becoming AI-fuelled, The Edge Singapore (1 August 2023) <https://www.theedgesingapore.com/digitaledge/digital-economy/dbs-shares-its-secret-becoming-ai-fuelled>

[41] Ibid.

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when the AI produces outputs that seem plausible but are either partially or completely false or nonsensical.[42] Hallucinations in AI are particularly problematic when the AI is used in contexts where accuracy and truth are critical. For instance, inaccuracy on risk assessment processes has negative implications for risk-taking and management. Also, financial services offered to customers through generative AI-supported chatbots could give inappropriate advice or offer unsuitable products to financial consumers.[43] These outcomes erode public trust in AI systems, but also, in financial institutions using this technology.

Mitigating hallucinations in AI requires careful model design, high-quality data for training, frequent updates with accurate information, and the implementation of safeguards like fact-checking and human oversight.

4.2. A Greater Explainability Problem

Explainability is an AI governance principle that is relevant in any type of AI use case.[44] However, this principle results more complex in certain AI use cases. Generative AI models can be complex, and interpretation may become difficult. Indeed, the vast amount of varied data is essential for the effectiveness of generative AI, but it also makes it complicated to trace the origins of a particular piece of information the AI produces.[45] This is exacerbated by the risk of hallucinations explain above. In addition, generative AI models use multiple layers within neural networks, which work together in intricate ways.[46]

These networks utilize a staggering number of parameters to weigh the likelihood of one element of its output over another. All these parameters act like a multitude of dials and switches, fine-tuning the AI's performance. As in deep-learning systems, this creates the problem often referred to as the black box.[47] As a result, it is challenging to understand how each internal decision contributes to the final output. This way of operation makes it challenging for financial institutions to iterate and explain automated outputs to customers or regulators.

4.3. Data Protection, Privacy in foundation models

[42] Matias del Campo and Neil Leach (eds), Machine Hallucinations: Architecture and Artificial Intelligence (John Wiley & Sons, 2022)
[43] Ghiath Shabsigh and El Bachir Boukherouaa, Generative Artificial Intelligence in Finance, International Monetary Fund (2023) <https://doi.org/10.5089/9798400251092.063>
[44] Araz Taeihagh, *Governance of artificial intelligence*, Policy and society 40.2 (2021): 137-157.
[45] Katie Atkinson, Trevor Bench-Capon, and Danushka Bollegala. "Explanation in AI and law: Past, present and future." Artificial Intelligence 289 (2020): 103387.
[46] Jakub M. Tomczak, "Why Deep Generative Modeling?." Deep Generative Modeling. Cham: Springer International Publishing, 2021. 1-12.
[47] Arun Rai, Explainable AI: From black box to glass box, Journal of the Academy of Marketing Science 48 (2020): 137-141.

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Foundation models are typically trained on vast amounts of data, which may include or collect inadvertently sensitive financial data, raising privacy issues in a highly regulated sector from a data protection perspective.[48] Moreover, the integration of publicly accessible generative AI systems, such as GPT, into the workflow of financial institutions amplifies this problem because of the risk of inadvertent disclosure of confidential financial details and personal data entered by employees of the financial institutions while interacting with the generative AI. Additionally, the terms and conditions of generative AI platforms explain that the technology provider doesn't guarantee the protection or privacy of user-provided data, which further emphasizes the potential security vulnerabilities associated with their use.[49]

Generative AI system internally developed by financial institutions may mitigate this problem but could also make it difficult for small financial institutions to take advantage of the potential benefits of cost reductions due to the impossibility of deploying their own internal model.

4.4. Fairness

Generative AI models are only as good as the data they are trained on. If the data contains biases or inaccuracies, these biases could be amplified by the generative AI model and, thus, wrong analysis. This could lead to discriminatory decisions or other adverse outcomes. Furthermore, the generated responses or new content in generative AI is influenced by prompts directed to the AI system. The prompts could carry in them human biases.[50] This is a significant problem because it can lead to discriminatory outcomes or reinforce societal inequalities in highly sensitive contexts such as access to finance. Some regulators have approach this risk of discrimination derived the use of AI in finance, particularly in lending markets, differently. As mentioned above, the AI Act considers this a high-risk model, but it does not address the nuances of generative AI in lending. Other regulators, such as the Monetary Authority of Singapore encourage financial institutions to assess the impact of the use of algorithmic credit scoring.[51] However, the metrics suggested by the regulators are not mandatory, and do not address the distinctions of generative AI.

4.5. Systemic Risk and Financial Stability

[48] Maanak Gupta, From ChatGPT to ThreatGPT: Impact of generative AI in cybersecurity and privacy, IEEE Access (2023).

[49] Ghiath Shabsigh and El Bachir Boukherouaa, Generative Artificial Intelligence in Finance, International Monetary Fund (2023) <https://doi.org/10.5089/9798400251092.063>

[50] Leonardo Nicoletti and Dina Bass. 2023. "Humans Are Biased: Generative AI Is Even Worse." Bloomberg Technology + Equality. Accessed June 23, 2023. https://www.bloomberg.com/graphics/2023-generative-ai-bias/

[51] The Monetary Authority of Singapore, MAS-led Industry Consortium Publishes Assessment Methodologies for Responsible Use of AI by Financial Institutions (4 February 2022) <https://www.mas.gov.sg/news/media-releases/2022/mas-led-industry-consortium-publishes-assessment-methodologies-for-responsible-use-of-ai-by-financial-institutions> accessed 13 June 2023.

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The widespread use of AI in finance impacts systemic risk in the financial sector in a unique way due to the inherent procyclicality of AI, the speed of AI outcomes, the new levels of interconnectedness derived from AI networks and new third-party dependencies, and the establishment of new sources of too big to fail issues. These challenges coupled with the lack of a consistent and enforceable approach to AI Governance and concrete models to assess the impact of AI on financial stability create a challenging environment for supervisors and financial institutions to prevent systemic risks in the era of AI.[52]

This problem is also aggravated by the use of generative AI. The potential excessive reliance on generative AI dues to its convenience may increase financial stability concerns. Decisions made by financial institutions employees based on generated economic, market, or risk reports could be susceptible to herd behavioural bias and mispricing if these reports reflect public sentiments captured by data sets and, consequently, used by AI systems.[53] Likewise, financial hallucinations could be systemically important if the misleading outputs expand in the financial system.[54] Also, rising interconnectedness due to the concentration of providers of foundations models makes the traditional financial stability issue of too big to fail more complicated. The technology markets are highly concentrated and the providers are outside of the perimeter of action of financial supervisors and regulators.[55]

4.6. Authorized Push Payment Frauds in the era of generative AI

Generative AI is also revolutionising financial crime. AI that is both increasingly sophisticated and available is making fraud and scams more effective into deceiving financial consumers to authorise payments. For example, fraudsters may use generative AI to impersonate customer service representatives from legitimate organizations in a more credible way due to the sophistication of the technology.[56] Generative AI systems can create such data in seconds and there are no barriers of access to the technology by fraudsters. The use of deepfakes is certainly something that should concern financial regulators when it comes to deal with authorized push payment fraud. Generative AI puts the any financial consumer at risk and even highly educated and conservative consumer may fall prey of scammers using generative AI systems capable of creating credible content.

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[52] Nydia Remolina, Interconnectedness and Financial Stability in the Era of Artificial Intelligence, in Artificial Intelligence in Finance: Challenges, Opportunities and Regulatory Developments, Edward Elgar Publishing (2023) https://www.e-elgar.com/shop/gbp/artificial-intelligence-in-finance-9781803926162.html

[53] Ghiath Shabsigh and El Bachir Boukherouaa, Generative Artificial Intelligence in Finance, International Monetary Fund (2023) <https://doi.org/10.5089/9798400251092.063>

[54] Ibid.

[55] Nydia Remolina, Interconnectedness and Financial Stability in the Era of Artificial Intelligence, in Artificial Intelligence in Finance: Challenges, Opportunities and Regulatory Developments, Edward Elgar Publishing (2023) https://www.e-elgar.com/shop/gbp/artificial-intelligence-in-finance-9781803926162.html

[56] https://resistant.ai/blog/fraudgpt-how-ai-is-revolutionizing-financial-crime

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5. Addressing the Nuances of Generative AI in Finance

5.1. The importance of a sector and sub-sector specific approach

Different industries have unique characteristics, risk profiles, and operational practices. AI applications in healthcare, finance, education, or law enforcement, for instance, each have distinct implications. Tailored regulation can address the specific risks and requirements of each sector, ensuring that AI is used safely and effectively without stifling innovation. Even within the financial sector, each AI use case has different implications and impact financial regulation goals differently. For instance, AI credit scoring may have a greater impact in financial inclusion, financial consumer protection and fairness due to the possibility of perpetuating discrimination in access to finance.[57] In contrast, the use of algorithmic trading may impact systemic risk and the way market misconduct operates in capital markets.[58] This analysis is applicable to generative AI in finance too. The use of generative AI to provide financial advice to consumers have different implications than use cases to enhance fraud monitoring.

Hence, a one-size-fits-all approach do not address the nuanced challenges present in different industries and, even, in different financial sector sub-industries. Some regulatory approaches, such as the AI Act adopt a risk-based approach to respond to this concern. Also, sectors evolve at different paces and directions. A sector-specific approach allows governance frameworks to adapt dynamically to the pace of AI development and deployment in each sector, facilitating timely updates to regulations.

5.2. Ex-post supervisory monitoring of AI systems

Ex-post supervisory monitoring involves the oversight and analysis of AI systems after deployment.[59] Such monitoring can reduce the risks linked to generative AI in finance by evaluating its impact and consequences within the sector. Financial regulators may mandate that institutions report both experimental and operational uses of generative AI. Continuous performance assessment of these systems enables supervisors to detect any deviations from expected outcomes, which may indicate issues like bias, errors, or other unforeseen problems, including threats to financial stability. This approach could be more effective than rigid legislation for managing generative AI in finance, given the technology's current developmental stage.

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[57] Talia Gilis, The Input Fallacy (2022), 106 Minnesota Law Review 1175

[58] Alessio Azzutti, Wolf-Georg Ringe, and H. Siegfried Stiehl. "Machine Learning, Market Manipulation, and Collusion on Capital Markets: Why the" Black Box" Matters." U. Pa. J. Int'l L. 43 (2021): 79.

[59] Talia Gilis, The Input Fallacy (2022), 106 Minnesota Law Review 1175; Nydia Remolina, *The Role of Financial Regulators in the Governance of Algorithmic Credit Scoring*, SMU CENTRE FOR AI & DATA GOVERNANCE RESEARCH PAPER NO. 2/2022 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4057986>

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5.3. Generative AI Audits in Finance

Algorithmic audits may become a common tool of AI regulation, as the EU AI Act intends for high-risk models and foundation models. Even outside of the implementation of this regulatory proposals, AI models like ChatGPT go through various forms of auditing and evaluation, although the specifics of these processes are not fully disclosed to the public for proprietary reasons. It is not clear how AI audits should be conducted, and the private sector has developed an unstandardised approach. This is still a nascent field in which regulators still need to think about the basic components before audits can reliably address algorithmic harms.[60]

Moreover, generative AI audits in finance is a policy that needs to be complemented with a requirement of human accountability. Generative AI output does not consist of decisions but of content. Accordingly, generative AI is mostly used to provide recommendations, advice, or analysis, where human actors should make decisions. Hence, financial regulators could clarify that financial institutions need to understand the reasons behind their decisions, and where these actions are based on outputs generated by generative AI systems. This requires from financial institutions an understanding the limitations of generative AI as just one component in the decision-making process.

5.4. Enhanced financial consumer protection

In the era of fraud sophistication, a cost-benefit analysis of changing the rules applicable to reimbursements in online scam cases, specially, authorized push payment fraud, could be fair for financial consumers. The United Kingdom is currently discussing a change in this policy to incentivise payment services providers to improve their fraud prevention capabilities, customers enjoying greater protections, and fraud victims having their money reimbursed with very limited exceptions.[61]

6. Conclusion

The integration of generative AI into the financial sector represents a pivotal shift with far-reaching implications. This paper has argued emphatically for a nuanced, context and sector-specific debate to address the multifaceted risks and challenges posed by generative AI in finance. The argument presented is not merely theoretical but emerges from the urgent need to align AI's rapid technological evolution with the equally dynamic financial landscape.

[60] Ellen P. Goodman and Julia Trehu, Algorithmic Auditing: Chasing Ai Accountability Algorithmic Auditing: Chasing Ai Accountability, 39 Santa Clara High Technology Law Journal Santa Clara High Technology Law Journal 290, https://digitalcommons.law.scu.edu/cgi/viewcontent.cgi?article=1689&context=chtlj

[61]

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The financial sector's adoption of generative AI comes with a promise of transformational change. From the nuanced personalization of customer interactions to the development of sophisticated fraud detection systems and the automated generation of financial reports, the potential applications are vast. However, these benefits are counterbalanced by an array of ethical and legal risks that demand careful scrutiny. This paper has endeavoured to delineate these risks, underscoring the importance of a contextual understanding of AI's role in finance.

At the heart of the discussion is the recognition that the implications of generative AI in finance are substantially different from those in less sensitive applications. For instance, the generation of creative content for marketing purposes carries different stakes than the use of AI to provide financial advice. The latter involves significant fiduciary responsibilities and the potential for far-reaching socioeconomic consequences, thus necessitating a more stringent governance framework.

This paper has highlighted the regulatory lacuna that currently exists, where most AI governance frameworks are heavily weighted towards predictive AI, often overlooking the distinct challenges of generative AI. The existing policy discussions and regulatory proposals, while foundational, are insufficient for the nuanced demands of the financial sector. They often lack the sector-specific granularity required to navigate the complex interplay between AI-generated outputs and the financial market's stability and integrity.

Finally, the paper analyses the heterogeneity of potential risks that generative AI generate in financial services. Building on this analysis, the paper has also charted a set of proposals to confront the challenges of experimenting with AI in finance.

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